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CONSTRUCTION OF SLED-TYPE CORNSTALK SHAVERS

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One of the effective methods of controlling the European corn borer is burning the infested cornstalks or removing them from the field before May 15. The stalks must be broken or cut off at ground level and raked into windrows or piles. It is important that all of the stalks, stubble, and trash be removed or destroyed. The practice of winter poling—dragging a heavy log or railroad iron sidewise across the field to break off the stalks—usually leaves many stalks still firmly rooted in the ground. If clean raking is to be done the stalks must all be cut free. To accomplish this simple stalk shavers have been developed. (Figs. 1 and 23.) Repeated tests of these

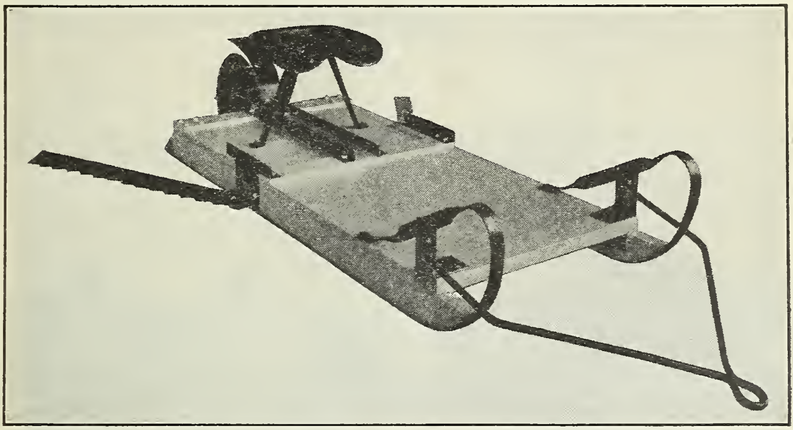

FIGURE 1.—Sled-type 2-row cornstalk shaver, No. 1

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[1] Recognition is given here to the farmers, county agents, and engineers who have contributed valuable ideas, and to the authors of the following publication: SILVER, E. A., and BARDEN, R. D. SOME SUGGESTIONS FOR THE CONSTRUCTION AND USE OF STALK SHAVERS. Ohio Agr. Col. Ext. European Corn Borer Leaflet 14, illus. 1928.

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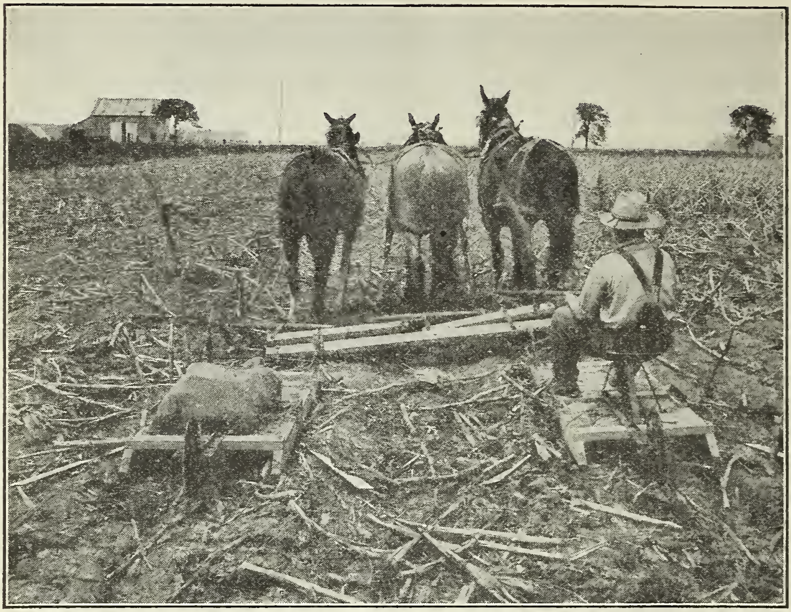

FIGURE 2.—Cutting four rows of cornstalks with two light stalk shavers drawn by three horses

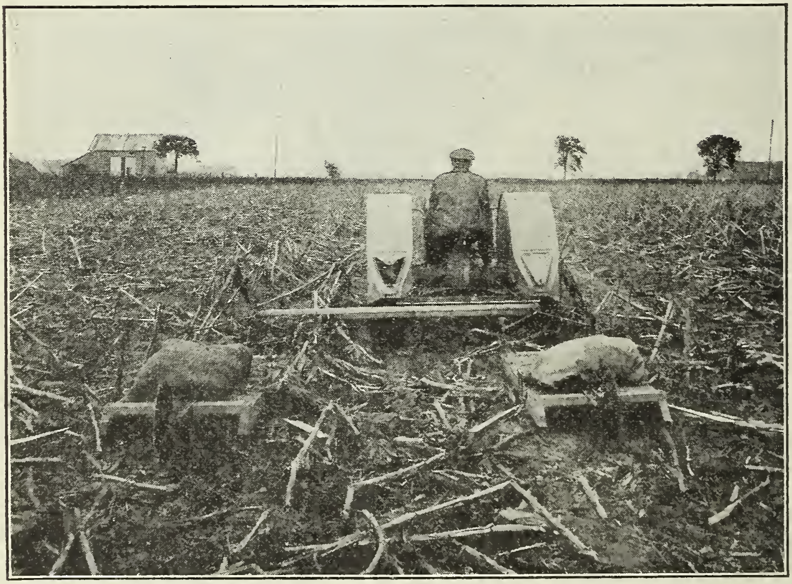

FIGURE 3.—Cutting four rows of cornstalks with two light stalk shavers drawn by tractor

devices under a wide variety of field conditions have given excellent results.

The chief advantages of the stalk shaver are its simple construction, light weight, light draft, low cost, and the possibility of placing two of the shavers abreast to cut four rows of stalks at one time. The 2-shaver unit may be pulled by three horses or a light tractor. (Figs. 2 and 3.) The parts for the shaver are of simple design, and can be easily made in a farm shop that is equipped with a few blacksmith and wood-working tools.

HOW TO BUILD STALK SHAVER NO. 1

All the materials required for making stalk shaver No. 1 are listed in Table 1. Some of them may be found in the machine shed or elsewhere on the farm. The dimensions given in the table are for the finished pieces, the lumber being dressed on all sides. Partly dressed or rough lumber may be used if allowance for its larger dimensions is made where necessary. The parts of the shaver are named in the assembly drawings. (Fig. 4.)

TABLE 1.—*Bill of material for sled-type stalk shaver No. 1*

Number of pieces	Material	Size of piece [1]	Used for—	Figure No.
2	Yellow pine	3½ by 1½ by 72 inches	Runners	5
3	do	3½ by 1½ by 28 inches	Cross members	6, 7, 8
4	do	11½ by ¾ by 28 inches	Floor	------
1	do	7 by ¾ by 28 inches	do	------
2	do	1½ by ¾ by 9 inches	Spacer blocks	9
2	Strap steel	1½ by 3⁄16 by 110 inches	Runner shoes	13
2	Mild steel	3 by ¼ by 9 inches	Hitch plates	11
2	do	6 by ¼ by 6¾ inches	Knife plates	14
1	do	4 by ⅛ by 26 inches	Colter guard	20
1	do	1½ by ¼ by 33 inches	Seat support	21
1	do	1½ by ¼ by 20 inches	Seat brace	19
1	do	1½ by 3⁄16 inches; length determined by type of colter.	Reinforcing plate	17
1	do	⅝ inch round by 72 inches	Drawbar	22
1	do	Diameter and length determined by type of colter.	Cotter axle shaft	------
4	Steel angle	2 by 2 by 3⁄16 by 3½ inches	Runner braces	12
2	do	2 by 2 by 3⁄16 by 6½ inches	Colter bearing brackets	18
2	do	1½ by 1½ by 3⁄16 by 39½ inches	Colter-support angles	16
2	do	1½ by 1½ by 3⁄16 by 12 inches	Knife-plate angles	10
1	Steel	15 inches diameter	Colter with hub and bearings	------
1	do	------	Seat	------
[2] 2	do	40-inch lister cultivator blades	Knives	15
14	Carriage bolts	5⁄16 by 5½ inches	Through runners	------
2	do	5⁄16 by 5 inches	do	------
8	do	5⁄16 by 2¼ inches	Through runner braces	------
3	do	5⁄16 by 1½ inches	Seat braces and colter guard	------
2	do	⅜ by 2¼ inches	Colter support to center cross member.	------
2	do	do	Knife plate to runner	------
1	do	7⁄16 by 1¼ inches	Seat	------
4	Machine bolts	5⁄16 by 2½ inches	Through hitch plates and runner braces.	------
2	do	⅜ by 2½ inches	Colter support to rear cross member and reinforcing plate.	------
4	do	⅜ by 1 inch	Colter-bearing bracket to support.	------
2	do	do	Hitch plate to runner shoe	------
4	do	do	Knife plate to knife-plate angle	------
4	Plow bolts, flat-head, square-shank.	do	Knives	------
4	Flat washers	5⁄16 inch	Rear cross member	------
16	Wood screws	No. 10 by 1½ inches	Runner shoes	------
2	Cotter keys	3⁄16 by 1¼ inches	Drawbar	------
36	Common wire nails	8-penny	Flooring	------

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[1] Finished dimensions; partly dressed or rough lumber will be somewhat larger.

[2] A pair consisting of 1 right and 1 left blade.

Each of the parts must be cut and drilled carefully according to the dimensions given in Figures 5 to 22. The steel parts, consisting of runner shoes (fig. 13), seat brace (fig. 19), colter guard (fig. 20), and seat support (fig. 21), may be most easily shaped by first chalking or penciling out full-size drawings on a level wooden or concrete floor and bending the metal to fit these drawings. Heating the steel to a dull cherry red facilitates bending.

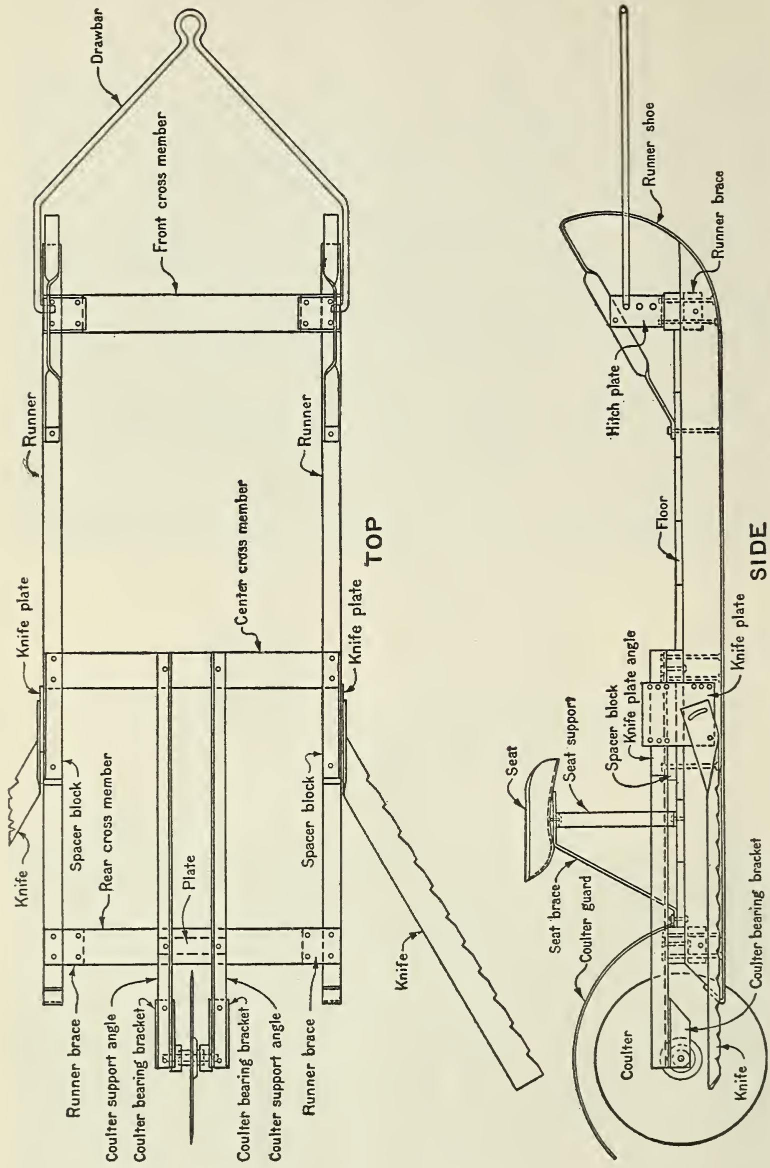


FIGURE 4.—Assembly, sled shaver No. 1 (top and side views). In the top view the colter guard, floor, seat, seat brace, and seat support are not shown

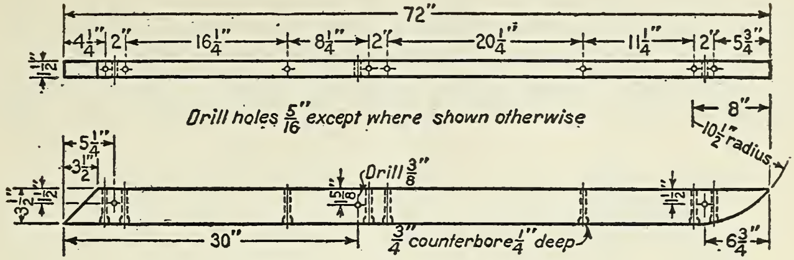


FIGURE 5.—Runner (make two alike)

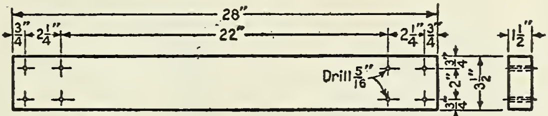


FIGURE 6.—Front cross member (make one)

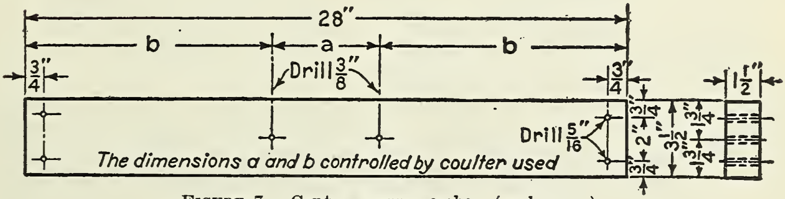


FIGURE 7.—Center cross member (make one)

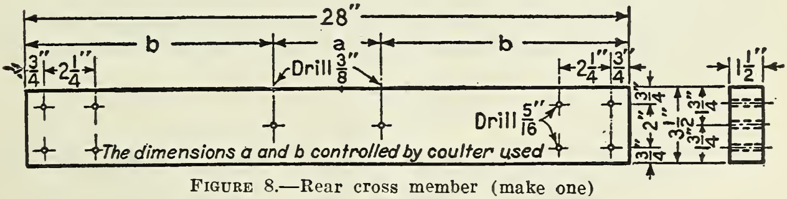


FIGURE 8.—Rear cross member (make one)

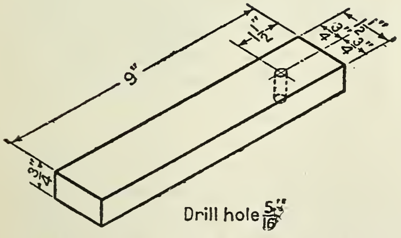


FIGURE 9.—Spacer block (make two alike)

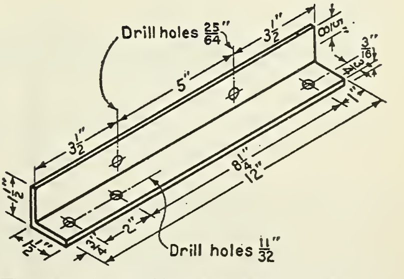


FIGURE 10.—Knife-plate angle (make one right and one left; right shown)

The knives (fig. 15) are 40-inch lister cultivator blades made by the John Deere Plow Co. The teeth may be ground into the edges with an emery wheel, the grinding being done from the under side. Any type of colter that can be held in place may be used. A bolt of proper size may be used for the colter axle shaft. The diameter of this shaft will be determined by the size of the hole in the colter bearings, and the shaft must be long enough to pass through the bearing brackets. The distance (*a*) between bolt holes in the center and rear cross members (figs. 7 and 8) and in the reinforcing plate (fig. 17) depends upon the colter used and should be 2 inches more than the over-all length of hub and bearings. The (*b*) dimensions are equal.

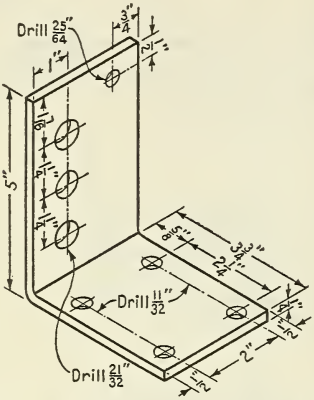


FIGURE 11.—Hitch plate (make one right and one left; right shown)

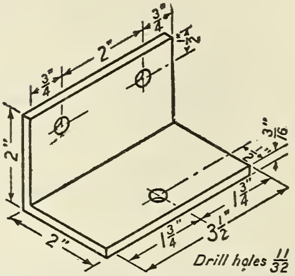


FIGURE 12.—Runner brace (make four alike)

The parts of this stalk shaver may be put together as follows:

Insert the $\frac{5}{16}$ by 5½ inch and $\frac{5}{16}$ by 5 inch carriage bolts into the runners (fig. 5) from below, using a 5-inch bolt in the third hole from the front in each runner, and place the cross members (figs. 6, 7, and 8) in position. Lay the floorboards between the cross members and nail them to the runners, being careful that the boards are square with the runners. Put a spacer block (fig. 9) over each runner just back of the center cross member, with rear end fitting on runner bolt, and nail it down. Bolt the rear cross member to the runner, using

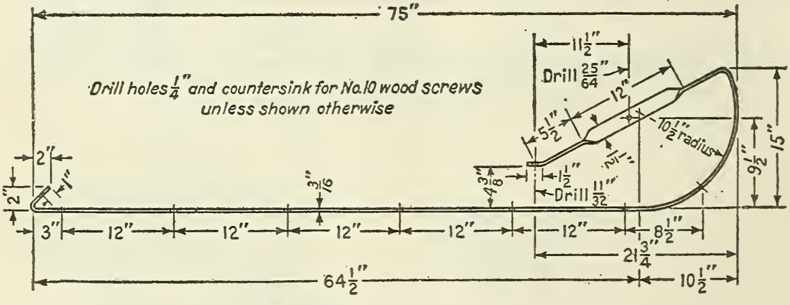


FIGURE 13.—Runner shoe (make two alike)

washers under nuts. Place the knife-plate angles (fig. 10) and the hitch plates (fig. 11) in position and bolt them to the runners. Next bolt two of the runner braces (fig. 12) to the rear cross member and the runners, using $\frac{5}{16}$ by 2¼ inch carriage bolts through both runners and cross members. Then bolt the other two runner braces to the front cross member and runners, using a $\frac{5}{16}$ by 2¼ inch carriage bolt through each runner and $\frac{5}{16}$ by 2½ inch machine bolts through the cross member and hitch plate.

Secure the runner shoes (fig. 13) to the runners with the No. 10 1½-inch wood screws. Bolt the extensions of the front ends to the runners and to the hitch plates using ⅜ by 1 inch machine bolts at the hitch plates.

Bolt the two colter support angles (fig. 16) to the center cross member with ⅜ by 2¼ inch carriage bolts and to the rear cross members with ⅜ by 2½ inch machine bolts, which are passed first through the reinforcing plate (fig. 17) on the underside of the rear cross member. Bolt the colter bearing brackets (fig. 18) to the underside of the colter support angles with ⅜ by 1 inch machine bolts. Place the colter with its hub and bearings between the bearing brackets and insert the axle shaft; fasten the shaft firmly in position, but loosely enough so that the colter will turn freely.

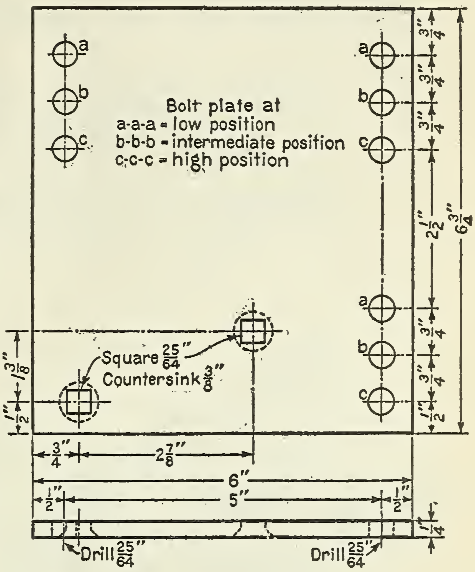


FIGURE 14.—Knife plate (make one right and one left; right shown)

Bolt the lower end of seat brace (fig. 19) and colter guard (fig. 20) to the floor of the sled, against the center of the rear cross member as shown in Figure 4, with a $\frac{5}{16}$ by 1½ inch carriage bolt. Place the seat support (fig. 21) under the other end of the seat brace, and bolt it to the floor with $\frac{5}{16}$ by 1½ inch carriage bolts. Bolt the seat on top with a $\frac{7}{16}$ by 1¼ inch carriage bolt. Any implement seat with corresponding bolt may be used. Attach the drawbar (fig. 22), using the $\frac{3}{16}$ by 1¼ inch cotter keys to hold it in place.

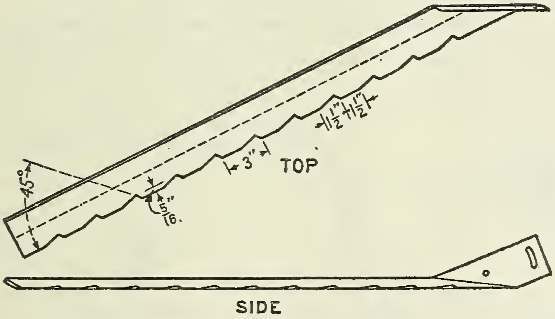


FIGURE 15.—Knife (made one right and one left; right shown)

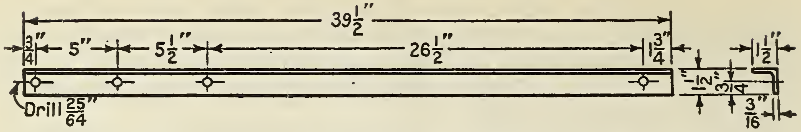


FIGURE 16.—Colter support angle (make one right and one left; right shown)

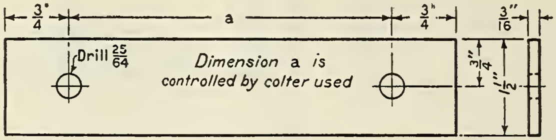


FIGURE 17.—Reinforcing plate (make one)

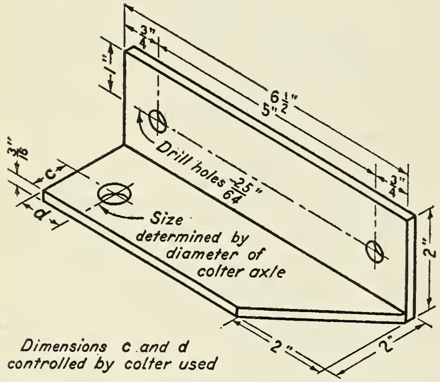

¾"
1"
6½"
5"
3/16"
c
d
Drill holes 25/64"
¾"
Size determined by diameter of colter axle
2"
2"
2"
Dimensions c and d controlled by colter used

FIGURE 18.—Colter bearing bracket (make one right and one left; right shown)

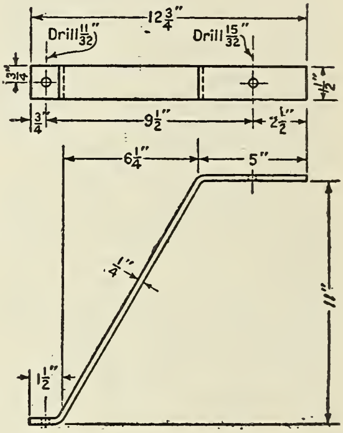


FIGURE 19.—Seat brace (make one)

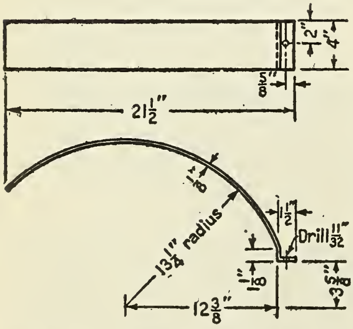


FIGURE 20.—Colter guard (make one)

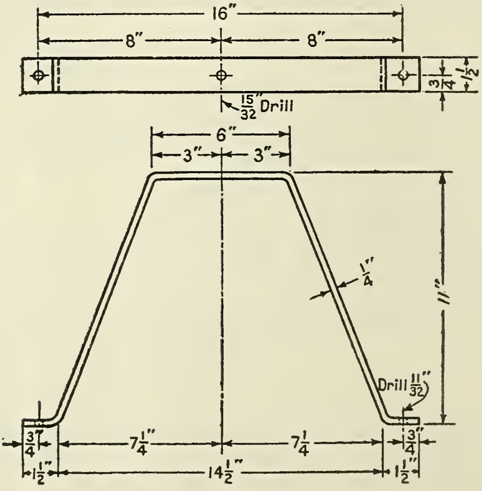


FIGURE 21.—Seat support (make one)

Insert the 3/8 by 1 inch square-shank plow bolts into the countersunk holes in the knife plates (fig. 14), and bolt the latter to the sides of the runners with 3/8 by 2¼ inch carriage bolts and to the knife-plate angles with 3/8 by 1 inch machine bolts. Attach the knives (fig. 15)to the projecting plow bolts.

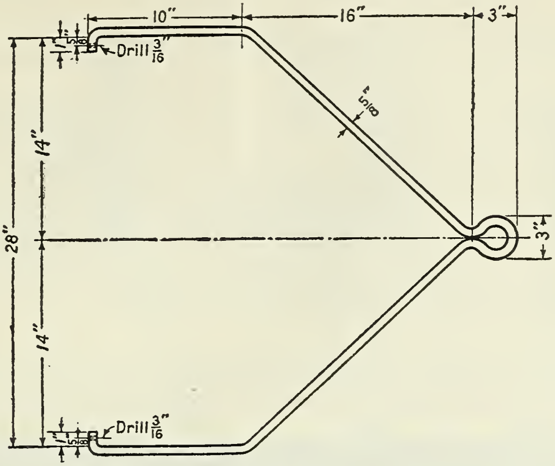


FIGURE 22.—Drawbar (make one)

HOW TO BUILD STALK SHAVER NO. 2

A very satisfactory sled shaver costing less than No. 1 can be made almost entirely of wood by the farmer who does not have a blacksmith shop but who does have a few carpenter's tools. Most of the material, perhaps all except the shaving blades, can be found on the farm. Such a shaver is pictured in Figure 23 and an assembly drawing with the parts named is shown in Figure 24.

Table 2 lists the materials required for making the shaver and the details of the various parts are shown in the drawings. (Figs. 25–33.) The dimensions given in the table and on the drawings are for the finished (dressed on all four sides) pieces. Rough or partly dressed lumber may be used if the necessary allowance is made for its larger dimensions.

TABLE 2.—*Bill of material for sled-type shaver No. 2*

Number of pieces	Material	Size of piece [1]	Used for—	Figure No.
2	Oak	3¾ by 1¾ by 72 inches	Runners	25
3	Yellow pine	3½ by 1½ by 28 inches	Cross members	26, 27
4	do	11½ by ¾ by 28 inches	Floor	------
1	do	7 by ¾ by 28 inches	do	------
1	do	5 by ¾ by 28 inches	do	------
2	do	3½ by 1½ by 41¼ inches	Colter supports	29
2	do	1½ by 1½ by 63½ inches	Fillets	28
2	do	2 by 1½ by 6 inches	Colter blocks	31
2	do	5½ by ¾ by 16 inches	Colter guard sides	30
2	do	¾ by ¾ by 11¼ inches	Guard cleats	33

[1] Finished dimensions; partly dressed or rough lumber will be somewhat larger.

TABLE 2.—*Bill of material for sled-type shaver No. 2*—Continued

Number of pieces	Material	Size of piece [1]	Used for—	Figure No.
1	Sheet iron	*a* by 19 inches (20-gage) [2]	Guard cover	32
24	Carriage bolts	5/16 by 5½ inches	Runners, colter blocks, and supports.	
4	do	⅜ by 2½ inches	Knives	
2	do	½ by 2½ inches	Hitch	
24	Flat washers	5/16 inch	Runner and colter support bolts	
2	do	⅜ inch	Front-knife bolts	
2	do	½ inch	Hitch bolts	
(3)	Common wire nails	8-penny	Flooring	
12	do	4-penny	Guard cover	
(4)	Steel	40-inch lister cultivator blades	Knives	
1	do	15-inch diameter	Colter with hub and axle	
1	do	6 feet of 3/16 or ¼ inch coil chain	Hitch	
1	do		Seat and support	

[2] Dimension *a* depends upon the length of the hub of the colter used.
[3] One-half pound.
[4] A pair consisting of 1 right and 1 left blade.

Each piece should be carefully laid out, cut and bored according to the detail drawings. The counterbored portions of the bolt holes through the runners and through the rear ends of the colter supports can be bored with an ordinary wood bit before the smaller holes

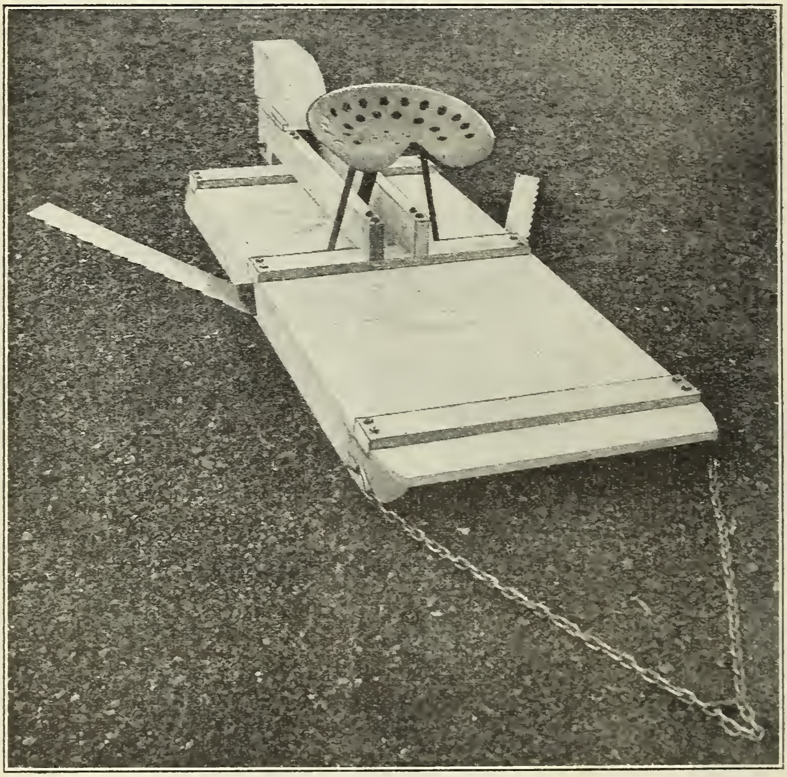


FIGURE 23.—Sled-type, 2-row cornstalk shaver No. 2

are bored through the pieces if no countersinking bit is available. If this is done the $\frac{5}{16}$-inch hole should be bored through to the middle from both sides so that the bolt holes will match up with the holes in the other pieces to be held by the same bolts. If a countersink bit is available the holes can be bored and counterbored as shown in Figures 25 and 29. Pine runners shod on the bottom with light steel straps can be used in place of the oak runners if they are more readily obtainable.

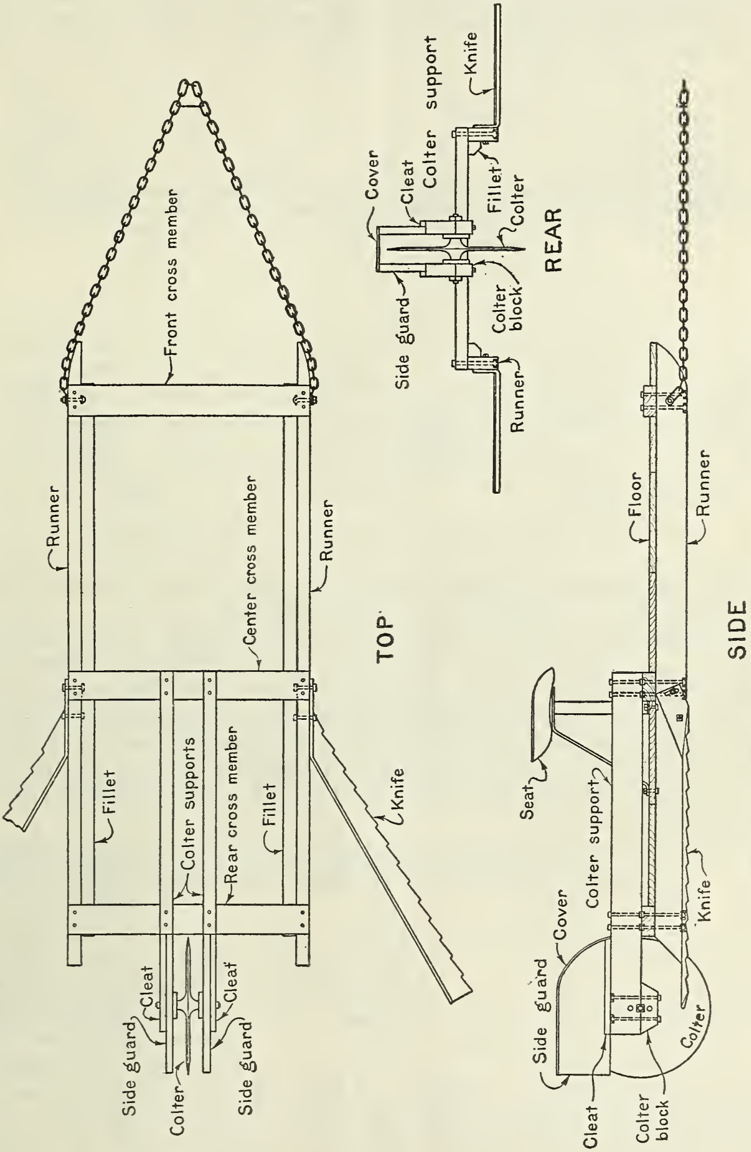


FIGURE 24.—Assembly (top, side, and rear views), sled shaver No. 2

The two fillets (fig. 28) can be ripped from a piece of 2 by 4 inch lumber if no 2 by 2 inch lumber is available. The 7/8-inch holes and the notches for the knife bolts are located and put in just before the strips are nailed in place. The holes for the colter axle should be bored through the colter supports and colter blocks (figs. 29 and 31) after the blocks have been bolted in place on the rear ends of the colter supports. The width of the colter guard cover (fig. 32) will depend upon the length of colter hub used and should not be cut until it is ready to be nailed in place.

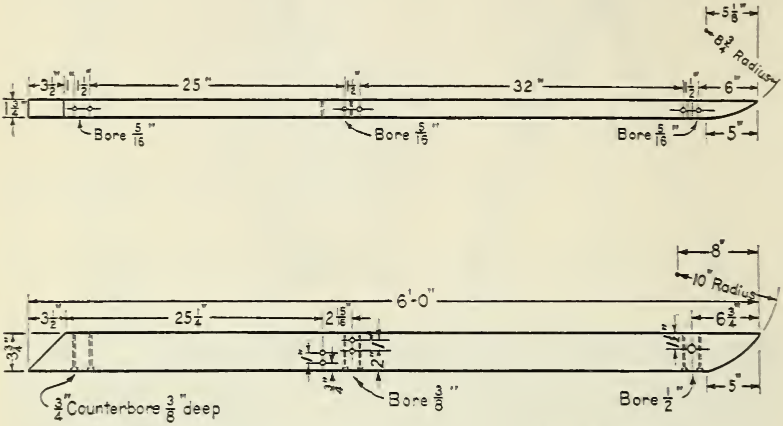


FIGURE 25.—Runner (make one right and one left; right shown)

The blades (fig. 15) are the same as those used on the shaver described on pages 3 to 9; that is, a pair of 40-inch lister cultivator blades, sold by the John Deere Plow Co. Teeth should be ground as shown, the grinding being done on the under side of the blade, maintaining approximately the same bevel as the blade originally had. The grinding can best be done on a power-driven emery wheel and perhaps should be done at a local blacksmith or machine shop.

The colter is used to keep the shaver running straight ahead. Any 14 or 15 inch rolling colter that can be held in place will do. A somewhat smaller one can be used if deeper colter blocks are used and the holes for the axle are set lower. A colter axle bolt of the proper diameter and length is needed. It must be long enough to go through the colter hub and through the two colter supports. The distance *a* between the bolt holes for the colter supports, in the center and rear cross members (fig. 27), depends upon the colter used. This dimension (*a*) should be equal to the over-all length of the disk hub and bearings plus the width of one colter support (that is, plus 1½ inches if colter supports of the dimensions shown are used.) The distances *b* are equal.

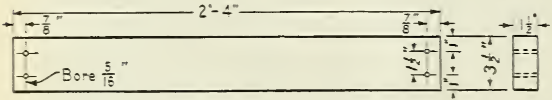
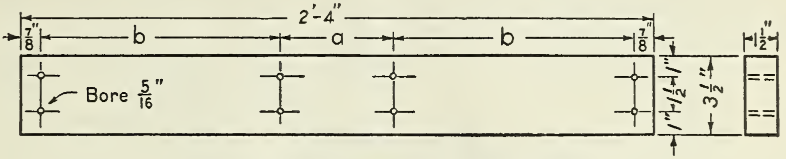


FIGURE 26.—Front cross member (make one)

The parts of this stalk shaver may be assembled in the following manner:

Bolt the colter blocks to the rear ends of the colter supports using $\frac{5}{16}$ by 5½ inch carriage bolts with flat washers under the nuts on the colter blocks. Bore the holes for the colter axle, the center of the intermediate hole being in the joint between the colter block and support. The size of these holes should be the same as that of the colter axle used and in both supports they must be exactly the same distance behind the holes for the $\frac{5}{16}$-inch bolts through the supports and cross members, or the colter will not be parallel to the runners. Next insert $\frac{5}{16}$ by 5½ inch carriage bolts in the runners from below and place the three cross members in position, allowing the bolts to come up through the cross members. Then insert $\frac{5}{16}$ by 5½ inch carriage bolts from the under side up through the holes near the center of the cross members and through the holes in the colter supports. Tighten nuts on all of the bolts, using flat washers under the nuts, first making sure that the cross members are square with the runners and that the colter supports are just wide enough at the back to allow the colter with bearings to be set between them and be free to rotate.



The dimensions *a* and *b* controlled by colter used

FIGURE 27.—Center and rear cross member (make two alike)

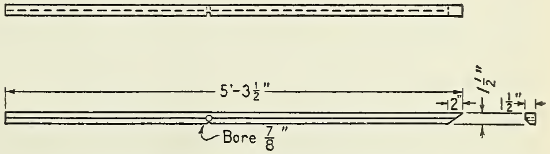


FIGURE 28.—Fillet (make one right and one left; left shown)

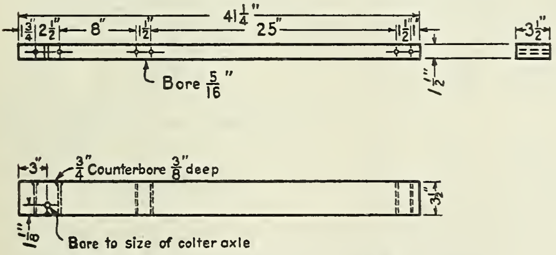


FIGURE 29.—Colter support (make two alike)

Turn the shaver frame upside down and insert from the inside the ½ by 2½ inch carriage bolts in the holes in the front ends of the runners. These bolts are for the hitch chain. To brace the runners, fillet pieces (fig. 28) are used. Notch the front ends of these fillets to allow for the round heads of the bolts just put in and then hold each fillet in place and mark through the upper front knife bolt hole in the runner the location for the ⅞-inch hole through the fillet. This large hole allows the front knife bolt to be slipped in or out of place. Also mark the location for a notch in the bottom edge of each fillet to allow the front knife bolt to be slipped in or out of the lower hole in the runner. Remove the fillet strips and bore the ⅞-inch hole and cut the notch in each one. Nail the fillets in place by driving the nails into both the runners and the 2 by 4 inch cross members.

Turn the shaver right side up and nail on the floor boards. Next nail the cleats (11¼ by ¾ by ¾ inches) on the outside of the colter guard pieces, making the cleats flush with the bottom and even with the front or curved end of the guard side. Then nail sides in place nailing down through the cleats into the colter supports. Cut out and nail the sheet-iron guard cover to the sides. A piece of board can be substituted for the sheet-iron cover.

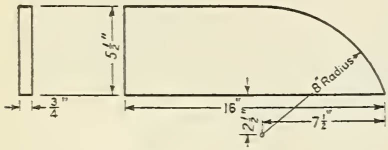


FIGURE 30.—Side colter guard (make two alike)

Mount the colter between the supports using one of the three pairs of holes for the axle. The pair used in the field will depend upon how much the corn is ridged and the depth of penetration of the colter.

The knives are bolted in place with ⅜ by 2½ inch carriage bolts with nuts on the outside and a flat washer under the nut of the front bolt, using one of the two pairs of holes provided. The height at which the knives will be used will depend upon field conditions. If further adjustment for height is desired, knife plates similar to those used on shaver No. 1 can be adapted to this shaver. The shaving should be done at or slightly below the ground surface.

The hitch consists of a light 6-foot chain fastened to the ½-inch bolts through the front ends of the runners. It will probably be necessary to spread the links for the bolts or to use a loop of wire to attach the chain to the bolts. If no chain is at hand two or three strands of heavy wire can be used for the hitch. In either case provision must be made for keeping the singletree centered. A detachable chain link or several strands of baling wire can be used on the chain or, if a wire hitch is used, a loop can be twisted for the singletree clevis.

Any farm-implement seat that can readily be attached to the shaver may be used. Figure 24 shows the shaver with seat mounted on braces (figs. 19 and 21) like those used on the shaver described on pages 3 to 9. A box nailed to the shaver can be substituted for the implement seat. It should be noted that the seat is located somewhat farther ahead on shaver No. 2 than on shaver No. 1 because the hitch on No. 2 is lower and there is more tendency for the front of the sled to be lifted off the ground.

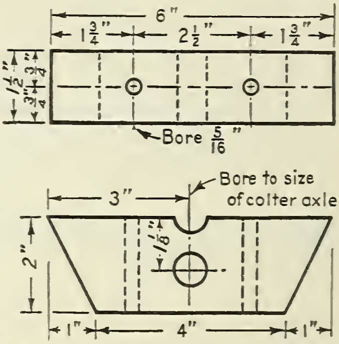


FIGURE 31.—Colter bearing block (make two alike

COST OF BUILDING A STALK SHAVER

Little definite can be stated regarding what it actually will cost to build a stalk shaver. Prices of materials and wages vary with place and time; probably some of the materials will be found already available without cost on nearly every farm, and the majority of farmers can do much of the woodwork at least.

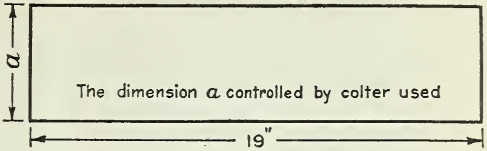


FIGURE 32.—Sheet-metal cover of colter guard (make one)

The labor for building shaver No. 1 is considerably greater than for No. 2, on account of the metal parts to be shaped and drilled. On the No. 2 shaver, however, a little more woodworking is necessary. Using prices prevalent in 1931, and assuming that all materials and labor will be purchased, the cost of each implement is estimated roughly as shown in Table 3.

TABLE 3.—*Cost of building a stalk shaver*

Item	Shaver No. 1	Shaver No. 2
Lumber	$1.25	$2.50
Steel and hardware	3.60	1.50
Knives	3.70	3.70
Colter with hub and bearings	3.20	3.20
Seat	1.25	1.25
Labor	14.00	7.00
Total	27.00	19.15

The estimates indicate a difference in cost of about $8 in favor of the all-wood construction. The more costly one undoubtedly will last longer if given the same usage. The prospective builder of a stalk shaver at any time and place can obtain a more accurate estimate of cost by getting quotations on those items of material and labor that he can not furnish.

OPERATING ADJUSTMENTS

The knives must be set to run at or slightly below the ground surface, the blade sloping slightly downward toward the rear or outer end. The drawbar on shaver No. 1 should be adjusted in the hitch plates to hold the front of the sled down and prevent side whipping.

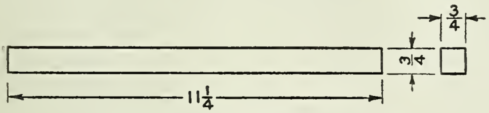


FIGURE 33.—Cleat (make two alike)

The colter must run sufficiently deep in the soil to hold the rear of the shaver steadily between the rows. This depth can be adjusted on shaver No. 1 by means of wooden blocks. To raise the colter, place blocks 2 inches wide and of the required thickness under the colter support angles on the center and the rear cross members. To lower the colter, place a block 2 inches wide and of the required thickness between each colter bearing bracket and the colter support angle to which it is fastened. Longer bolts will have to be provided to hold the colter support to the center and rear cross members or to hold the colter bearing bracket to the colter support if either of these adjustments is made. The depth adjustment of the colter on shaver No. 2 can be made by placing the colter axle in different holes. Care must be used to mount the colter blade parallel to the runners.

For best results it is necessary to pull the shaver between the two rows that were dropped simultaneously by the planter.

TWO-SHAVER 4-ROW UNIT

Two sleds may be drawn as a 4-row unit by using a special 3-horse hitch (fig. 34) for horses or a cross bar rigidly attached to a tractor.

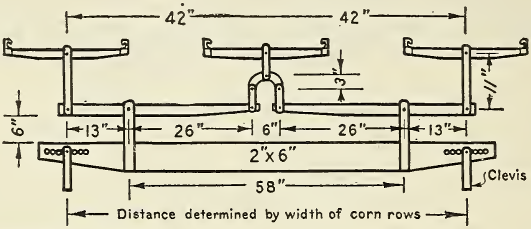


FIGURE 34.—Special 3-horse hitch for 2-shaver 4-row unit

When using horses the driver sits on one sled and has a weight (a sack of sand is satisfactory) about equal to his own weight on the other sled. When using a tractor, a sack of sand or other weight is placed on each sled while the driver rides the tractor.

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